

### **REMARKS**

The features of dependent claims 3, 25, and 26 are incorporated into independent claim 35. Claims 3, 25, and 26 are accordingly cancelled, without prejudice. Claims 2, 4-24, 27-31, and 35-49 are now present in this application.

#### **The invention**

The present invention relates to web forming in the process of manufacturing paper. See, for instance, page 1, line 13 and page 8, lines 4-56 of Applicants' specification. According to the process of the present invention, a filler is pre-treated with inorganic anionic colloidal particles by combining a slurry or a sol of inorganic colloidal particles and a filler slurry and combining this aqueous slurry of pre-treated filler with an aqueous suspension containing cellulose fiber to form a stock. The stock formed in this way is treated with a cationic retention agent which is a cationic polymer having a molecular weight of at least 500,000 g/mol. The treated stock is filtered to form a web and the web is dried to form paper.

The method of the present invention serves to improve retention during the web forming process. This is achieved by treating the filler with colloidal material. At the same time, savings in consumption of expensive retention polymers are obtained.

In the present invention, the filler is first pre-treated with the colloid in water, giving an aqueous slurry of colloid-treated filler. Then, the aqueous slurry is mixed with an aqueous fiber suspension to give a stock. Finally, the stock is treated with the cationic agent before screening.

This specific sequence leads to good filler retention without flock formation.

Pre-treatment with an inorganic anionic colloid is particularly advantageous, because it yields especially desirable benefits. See, e.g., page 3, lines 26 to 33 in the specification. Firstly, an anionic colloid covers the filler particles by anionic charge, so that they flocculate more readily during addition of a cationic retention agent, and re-flocculate after any shearing force treatment. Retention improves and the consumption of cationic retention agent will decrease. Secondly, only filler particles that have an important function are covered with an anionic colloid by interacting with the cationic parts of the mineral. Other less important fines remain uncovered. In other words, in the present invention a smaller amount of anionic colloid is

required for filler retention. Thirdly, a larger portion of filler particles are covered with anionic colloid and retained. This yields to more efficient filler use and thus to cost savings.

Beckner and Keiser

Claims 2-4, 7, 8, 11, 14-31, 35-38, 42, 43, and 45-49 were rejected under 35 U.S.C. § 103(a) as being unpatentable over US 3,758,376 (Beckner) in view of US 2001/0030032 A1 (Keiser). Office Action, pages 3-6. The rejection is respectfully traversed.

The Beckner system is significantly different from the technology of the present invention. Beckner is not concerned with improving retention in paper manufacture. Beckner discloses a process for production of gray opaque paper suitable for photographic print paper. In the photographic print paper, light adsorbing colorants are used in combination with light scattering white pigment particles and colloidal material carrying an electrical charge on the surface of the colloid. The light absorbing colorants used in Beckner are water dispersible black pigments or water soluble black dyes.

The present invention, in contrast, concerns printing papers. Carbon black is not a factor in manufacturing printing papers. In Example 1, Beckner disclosed that magnesium silicate (colloidal material) and titanium dioxide (light scattering white pigment particles) dispersions were added to photographic grade sulfite and Kraft wood fibers. Prior to formation of opaque paper, cationic starch and rosin size were added to the pulp suspension, and just after addition of the cationic starch, predispersed carbon black was added and the paper web was formed. It should be noted that Beckner does not suggest pre-treating filler with colloidal material. In Beckner, colloidal material and titanium dioxide dispersions are both added to wood fibers. Further, Beckner uses colloidal material carrying an electrical charge (anionic or cationic), whereas – in the present invention – the advantages are obtained in particular when using anionic colloidal material. Furthermore, Beckner uses cationic starch as cationic polymer, whereas Applicants' invention does not employ cationic starch.

Beckner mentions retention, but his aim is not to improve it. Beckner mentions that retention of the filler and other additives was substantially complete since the 'white-water' was recirculated. However, this only indicates that retention of pigment was sufficient, when water was circulated. This does not teach or suggest anything about retention efficiency of filler

particles obtained by pre-treating filler with inorganic colloidal particles.

Keiser discloses a borosilicate retention aid composition in papermaking. Aqueous dispersion of colloidal particles of borosilicate are added into papermaking furnish. A nonionic, cationic, or anionic polymeric flocculant is added to the furnish either before or after addition of the borosilicate. Cationic starch or polymer may be added in addition to or in place of polymeric flocculant. Keiser does not teach or suggest the pre-treatment of filler, as disclosed in the present invention.

A person of ordinary skill in the art would not have combined the teachings of Beckner and Keiser at the time Applicants' invention was made in order to improve retention in paper manufacture, since Beckner is concerned with the production of print paper for photographic use, not the manufacture of printing paper as the present invention. Beckner did not face the problem of the present invention – that is, how to improve retention in paper manufacture. The retention aid composition of Keiser is based on a different chemical, borosilicate. Keiser, moreover, does not teach or suggest filler pre-treatment.

It is manifest that the combination of Keiser with Beckner fails to enable “A process for the manufacturing of paper, said process comprising the steps of: *pre-treating a filler* with anionic inorganic colloidal particles having an average particle size in water of less than 100 nm by combining an aqueous slurry or a sol of said inorganic colloidal particles and a filler slurry combining the aqueous slurry of pre-treated filler with an aqueous suspension containing cellulose fibers to form a stock, comprising the steps of: treating the formed stock at least with a cationic retention agent which is *a cationic polyacrylamide or acrylamide copolymer* having a molecular weight of at least 500,000 g/mol, and filtering the treated stock to form a web and drying the web to form said paper.”

Beckner and Keiser and Wen

Claims 6, 10, and 40 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Beckner and Keiser in view of US 2003/0024437 (Wen). Office Action, pages 6-8. The rejection is respectfully traversed.

The Beckner and Keiser disclosures are discussed above. Wen fails to remedy the deficiencies of the Beckner and Keiser disclosures.

Wen concerns methods and compositions for changing the characteristics of pigments by precipitating inorganic solids in the presence of a suitable surfactant. The Wen disclosure has nothing to do with web forming and does not teach filler pre-treatment. A person skilled in the art would not have combined the Wen technology with that of Beckner and Keiser.

Beckner and Keiser and Neivandt

Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Beckner and Keiser in view of US 2005/0150621 A1 (Neivandt). Office Action, page 8. The rejection is respectfully traversed.

The Beckner and Keiser disclosures are discussed above. The Neivandt publication fails to remedy the deficiencies of the Beckner and Keiser disclosures.

Neivandt relates to compositions obtained by cooking starch and combining starch, before or after the cooking, with a polymer containing anionic groups, such as acidic groups or salts or acidic groups. The compositions may comprise montmorillonite and bentonite based pre-treatment colloids. Neivandt does not relate to filler pre-treatment with colloidal material.

Beckner and Keiser and Lunden

Claims 9 and 39 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Beckner and Keiser in view of US 6,887,351 B1 (Lunden). Office Action, pages 8-9. The rejection is respectfully traversed.

The Beckner and Keiser disclosures are discussed above. Lunden fails to remedy the deficiencies of the Beckner and Keiser disclosures.

Lunden concerns the use of colloidal precipitated calcium carbonate (PPC) as a filler to control the porosity and print properties of paper. The Lunden reference does not teach filler pre-treatment in accordance with the present invention.

Beckner and Keiser and Werner

Claims 12 and 44 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Beckner and Keiser in view of US 2,992,962 (Werner). Office Action, pages 9-10. The rejection is respectfully traversed.

The Beckner and Keiser disclosures are discussed above. The Werner disclosure fails to remedy the deficiencies of the Beckner and Keiser disclosures.

The Werner patent, based upon an application filed in 1954, relates to a process for simultaneously sizing and filling paper under alkaline conditions in the wet end of the papermaking process. In a particular embodiment, a mineral filler is coated both with a particular sizing agent and a retention agent under alkaline conditions. Werner teaches that the finely divided mineral filler or loading agent is pre-treated in an aqueous dispersion or emulsion of a sizing agent. The sizing agents are dimers of aliphatic ketenes. Werner does not teach or suggest filler pre-treatment with colloidal materials.

Beckner and Keiser and Wen and Werner

Claims 13 and 41 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Beckner and Keiser and Wen and Werner. Office Action, page 10. The rejection is respectfully traversed, for reasons set forth in the discussion of the Beckner and Keiser and Wen and Werner disclosures hereinabove.

Cornec and Wen

Claims 9 and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over WO 00/35193 (Le Cornec) in view of Wen. Office Action, pages 10-11. The rejection is respectfully traversed.

Le Cornec concerns a method for preparing a composition, useful as opacifier, based on  $\text{TiO}_2$ . The method of Le Cornec consists of mixing an aqueous dispersion of at least an inorganic spacer with an aqueous  $\text{TiO}_2$  dispersion, in conditions such that the two mineral species combine into mixed mineral flocs. Le Cornec does not teach filler pre-treatment with colloidal materials.

Wen concerns methods and compositions for changing the characteristics of pigments by precipitating inorganic solids in the presence of a suitable surfactant. The Wen disclosure has nothing to do with web forming and does not teach filler pre-treatment. A person skilled in the art would not have combined the Wen technology with that of Beckner and Keiser.

The combination of the Wen and Le Cornec disclosures clearly does not teach or suggest the inventions of claims 9 and 35 in their present form.

Conclusion

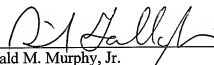
Applicants respectfully submit that none of the rejections of record is sustainable with respect to any of claims 2, 4-24, 27-31, and 35-49 now present in this application. Therefore, withdrawal of the rejections – and passage of this application to Issue – are earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Raymond C. Stewart, Registration No. 21,066, at the telephone number of the undersigned below to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

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Respectfully submitted,

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